CLAIMS

1. A method of manufacturing a laminated stator core, comprising the steps of:

forming a band-shaped yoke core piece having a shape that a yoke of the laminated stator core is developed in a straight line and having concave connection portions in the inner circumferential edge thereof by punching a metal plate;

forming a laminated yoke body by winding and laminating the band-shaped yoke core piece in a spiral shape and coupling the laminated band-shaped yoke core piece in a caulking manner;

forming a magnetic core piece having a convex connection portion at the base end thereof by punching a metal plate;

forming a laminated magnetic body by laminating and coupling a predetermined number of the magnetic core pieces to each other in a caulking manner; and

coupling the laminated yoke body and the laminated magnetic body to each other by winding a coil around the laminated magnetic body and then inserting the convex connection portions into the concave connection portions.

2. The method according to Claim 1, wherein the forming a laminated yoke body comprises stretching the band-shaped yoke core piece in a longitudinal direction by locally pressing the outer circumferential edge thereof when winding and laminating the band-shaped yoke core piece.

3. The method according to Claim 1, further comprising correcting the shape of the laminated yoke body by applying a diameter enlarging force from the inner circumference of the laminated yoke body, after the forming the laminated yoke body and before the coupling the laminated magnetic bodies to the laminated yoke body.

4. The method according to Claim 1, wherein the convex connection portions in the laminated magnetic body has a tapered shape with a wide front end.

5. The method according to Claim 1 or 2, wherein a minute protrusion is

formed at the side of each convex connection portion in the laminated magnetic body.

6. The method according to Claim 1 or 2, wherein after the convex connection portions of the laminated magnetic body are inserted into the concave connection portions of the laminate yoke body, a fixing engagement portion is formed in at least one of the concave connection portion and the convex connection portion through a pressing process

7. The method according to Claim 1, wherein in the forming the laminate yoke body, caulking portions are in advance in the band-shaped yoke core pieces, the band-shaped yoke core pieces are coupled to each other by the use of the caulking portions in a caulking manner, and the caulking portions or peripheries of the caulking portions including the caulking portions are pressed locally.

8. The method according to Claim 7, wherein the area where the periphery of each caulking portion including the caulking portion is locally pressed is an area which is widened from the caulking portion toward the outer circumferential edge of each band-shaped yoke core piece.

9. The method according to Claim 1, wherein the band-shaped yoke core piece formed in the forming the band-shaped yoke core piece has a shape that a yoke of the laminated stator core is developed in a straight line and concave connection portions and arc-shaped caulking portions having a plane shape curved in a winding direction are arranged with a constant pitch in the inner circumferential edge thereof, and

wherein in the forming the laminated yoke body, caulking tongues of the arc-shaped caulking portions are inserted into caulking grooves of the arc-shaped caulking portions in a lower layer while winding and laminating the band-shaped yoke core piece in a spiral shape.

10. The method according to Claim 9, wherein the caulking tongues of the arc-shaped caulking portions are tilted downwardly in a direction opposite to the winding direction at the time of winding the band-shaped yoke core piece.

11. The method according to Claim 9, wherein the caulking tongues of the arc-shaped caulking portions are tilted downwardly in the winding direction at the time of winding the band-shaped yoke core piece.

12. The method according to Claim 1, wherein the magnetic core piece constituting the laminated magnetic body is made of a material having a iron loss smaller than that of the band-shaped yoke core piece constituting the laminated yoke body.

13. A method of manufacturing a laminated stator core, comprising the steps of:

forming a band-shaped yoke core sub-piece having a shape that an outer half is developed in a straight line when a yoke portion of the laminated stator core is divided into two halves in the width direction by punching a metal plate;

forming an outer laminated yoke body by winding and laminating the band-shaped yoke core sub-piece in a spiral shape and coupling it in a caulking manner;

forming an inner yoke-attachment magnetic core sub-piece having an inner yoke sub-portion obtained by dividing the inner half in a unit of magnetic poles when the yoke portion of the laminated stator core is divided into two halves in the width direction, by punching a metal plate;

forming an inner yoke-attachment laminated magnetic sub-body by laminating and coupling a predetermined number of the inner yoke-attachment magnetic core sub-pieces to each other in a caulking manner;

forming an intermediate assembly in which the inner yoke sub-portions form a ring shape by winding a coil on the inner yoke-attachment laminated magnetic sub-body and connecting the ends of the inner yoke sub-portions in a predetermined number of the inner yoke-attachment laminated magnetic sub-bodies to each other; and

coupling the inner yoke-attachment laminated magnetic sub-bodies to the outer laminated yoke body by shrink-fitting the outer laminated yoke body to the outer circumference of the intermediate assembly.

14. The method according to Claim 13, wherein in the forming the

intermediate assembly, a predetermined number of the inner yoke-attachment laminated magnetic sub-bodies are temporarily held from the inner circumference by the use of a magnetic adsorptive supporting means.

15. The method according to Claim 13, wherein each inner yoke-attachment laminated magnetic sub-body is formed by coupling a predetermined number of the inner yoke-attachment magnetic core sub-pieces having different lengths from a magnetic pole portion to an end of each inner yoke sub-portion and a convex engagement portion and a concave engagement portion are formed at both ends of each inner yoke sub-portion, respectiely, and

wherein in the forming the intermediate assembly, the convex engagement portion of each inner yoke-attachment laminated magnetic sub-body is inserted into the concave engagement portion of the inner yoke-attachment laminated magnetic sub-body adjacent thereto.

16. A method of manufacturing a laminated stator core, comprising the steps of:

forming a band-shaped yoke core sub-piece having a shape that an outer half is developed in a straight line when a yoke portion of the laminated stator core is divided into two halves in the width direction and having concave connection portions in the inner circumferential edge thereof by punching a metal plate;

forming an outer laminated yoke body by winding and laminating the band-shaped yoke core sub-piece in a spiral shape and coupling it in a caulking manner;

forming an inner yoke-attachment magnetic core sub-piece having a convex connection portion at the back side of an inner yoke sub-portion obtained by dividing the inner half in a unit of magnetic poles when the yoke portion of the laminated stator core is divided into two halves in the width direction, by punching a metal plate;

forming an inner yoke-attachment laminated magnetic sub-body by laminating and coupling a predetermined number of the inner yoke-attachment magnetic core sub-pieces to each other in a caulking manner; and

coupling the inner yoke-attachment laminated magnetic sub-body to the outer laminated yoke body by winding a coil on the inner yoke-attachment laminated magnetic

sub-body and inserting the convex connection portion into the concave connection portion.

17. The method according to Claim 13, wherein concave connection portions are formed in the inner circumferential edge of the band-shaped yoke core sub-piece which is the outer half when the yoke portion of the laminated stator core is divided into two halves in the width direction,

wherein convex connection portions are formed at the back side of the inner yoke sub-portion which is the inner half when the yoke portion of the laminated stator core is divided into two halves in the width direction, and

wherein the inner yoke-attachment laminated magnetic sub-body is coupled to the outer laminated yoke body by inserting the convex connection portions into the concave connection portions.

18. The method according to Claim 17, wherein in the forming the intermediate assembly, a predetermined number of the inner yoke-attachment laminated magnetic sub-bodies are temporarily held from the inner circumference by the use of a magnetic adsorptive supporting means.

19. The method according to Claim 16, wherein each inner yoke-attachment laminated magnetic sub-body is formed by coupling a predetermined number of the inner yoke-attachment magnetic core sub-pieces having different lengths from a magnetic pole portion to an end of the inner yoke sub-portion and a convex engagement portion and a concave engagement portion are formed at both ends of the inner yoke sub-portion, respectively, and

wherein in the forming the intermediate assembly, the convex engagement portion of each inner yoke-attachment laminated magnetic sub-body is inserted into the concave engagement portion of the inner yoke-attachment laminated magnetic sub-body adjacent thereto.

20. A method of manufacturing a laminated rotor core by coupling a band-shaped core piece, which is wound and laminated in a spiral shape, in a caulking manner, the method comprising:

forming a band-shaped core piece having a shape that the laminated rotor core is developed in a straight line by punching a metal plate, wherein cut portions are formed with a predetermined pitch in the inner circumferential edge, the inner circumferential edge between the adjacent cut portions is formed in an arc shape corresponding to the inner circumference of a shaft hole, and magnet fitting holes are formed with a predetermined pitch in an intermediate portion in the width direction; and

winding and laminating the band-shaped core piece in a spiral shape while locally pressing and stretching the outer circumferential edge of the band-shaped core piece, and coupling the laminated band-shaped core piece in a caulking manner.

21. The method according to Claim 20, wherein the cut portions formed in the inner circumferential edge of the band-shaped core piece extend to the center in the width direction of the band-shaped core piece.

22. The method according to Claim 20, wherein the area where the outer circumferential edge of the band-shaped core piece is locally pressed is widened toward the outer circumferential edge.

23. A method of manufacturing a laminated rotor core by coupling a band-shaped core piece, which is wound and laminated in a spiral shape, in a caulking manner, the method comprising:

forming a band-shaped core piece having a shape that the laminated rotor core is developed in a straight line by punching a metal plate, wherein cut portions are formed with a predetermined pitch in the inner circumferential edge, the inner circumferential edge between the adjacent cut portions is formed in an arc shape corresponding to the inner circumference of a shaft hole, and diecast metal filling holes are formed with a predetermined pitch in an intermediate portion in the width direction; and

winding and laminating the band-shaped core piece in a spiral shape while locally pressing and stretching the outer circumferential edge of the band-shaped core piece, and coupling the laminated band-shaped core piece in a caulking manner.

24. The method according to Claim 23, wherein the cut portions formed in the

inner circumferential edge of the band-shaped core piece extend to the center in the width direction of the band-shaped core piece.

25. The method according to Claim 23, wherein the area where the outer circumferential edge of the band-shaped core piece is locally pressed is widened toward the outer circumferential edge.